

REMARKS

Applicants have amended claim 1 to include all limitations recited in claim 16 to more particularly point out and distinctly claim the subject matter of this invention. In view of this amendment, Applicants have canceled claims 16, 18, and 19. Claims 20 and 21 have also been canceled as being drawn to non-elected claims. Applicants have further added claims 22 and 23, support for which can be found at page 8, lines 28-31.¹ Finally, Applicants have amended claim 5 to correct a minor deficiency. No new matter has been added by the amendments.

Claims 1-15, 17, 22, and 23 are now pending. Reconsideration of the application, as amended, is requested in view of the remarks below.

Rejection under 35 U.S.C. § 112, second paragraph

Claim 5 is rejected as being indefinite. More specifically, the Examiner points out that the phrase "said zeolite" has no antecedent basis. Applicants have amended claim 5 to rectify this deficiency.

Rejection under 35 U.S.C. § 102(b)

Claims 1 and 3-9 are rejected as being anticipated by Kurokawa et al., US Patent 5,958,826 (Kurokawa). Claim 1, the only independent claim, will be discussed first.

Claim 1, as amended, covers an exhaust gas purifying catalyst which includes (1) a first catalyst component containing a refractory inorganic oxide carrying a platinum family metal, a nitrogen oxide adsorbent, and a hydrocarbon adsorbent; and (2) a second catalyst component for the purification of nitrogen oxide. The first catalyst component is disposed on the upstream side and the second catalyst component is disposed on the downstream side relative to the direction of

¹ Claim 22, dependent from claim 1, recites that the second catalyst component contains a porous inorganic oxide carrying a Pt material. Claim 23, dependent from claim 23, recites that the porous inorganic oxide is a zeolite. Support for both recited limitations can be found at page 8, lines 28-31.

the exhaust gas flow. Due to this arrangement, the exhaust gas passes by the two catalyst components sequentially.²

Kurokawa discloses an exhaust gas emission control catalyst which includes (1) an over catalyst layer (a first catalyst component) typically containing a water-absorbing agent, i.e., metal silicate, a platinum family metal, and barium and lanthanum; and (2) an under catalyst layer (a second catalyst component) containing a catalytic metal, e.g., palladium. The under layer is coated on the surface of a carrier. The over layer is coated on the top of the under layer. As a result, the exhaust gas passes by the two catalyst layers concurrently.³

Given this difference between the catalyst of claim 1 and the Kurokawa catalyst, claim 1 is clearly not anticipated by Kurokawa. Neither are claims 3-9, which depend from claim 1.

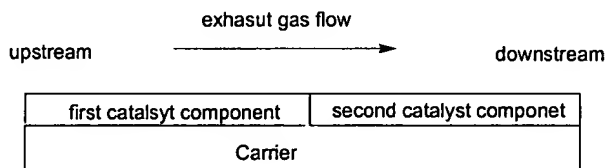
Rejection under 35 U.S.C. § 103

Claims 2 and 10-19 are rejected on various grounds. Applicants will traverse each ground as follows:

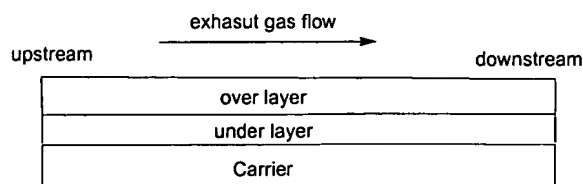
I

Claims 2, 18, and 19 are rejected as being unpatentable over Kurokawa in view of Kunio et al., JP 07-047227 (Kunio). Among the rejected claims, claims 18 and 19 have been canceled.

² As shown below, the exhaust gas first passes by the first catalyst component and then passes the second catalyst component:



³ As shown below, the exhaust gas passes by the over layer and the under layer at the same time:



Claim 2 depends from claim 1. The patentability of claim 2 resides at least in part in the **upstream-and-downstream arrangement** of a first catalyst component and a second catalyst component. See amended claim 1.

As discussed above, Kurokawa teaches **disposing one catalytic layer on the top of another catalytic layer**. It does not teach or suggest an upstream-and-downstream arrangement of two layers. Kunio does not cure this deficiency. Rather, it discloses a process for purifying an exhaust gas in which nitrogen oxide is absorbed on an adsorbent bed. Nowhere in Kunio are two catalyst components taught or suggested, not to mention an upstream-and-downstream arrangement of two catalyst components. As neither Kurokawa nor Kunio suggests or teaches disposing one catalyst component on the upstream side and the other on the downstream side, a combination of these two references also fails to do so. In other words, claim 2, drawn to a catalyst that requires an **upstream-and-downstream arrangement** of two catalyst components, is nonobvious over Kurokawa in view of Kunio.

II

Claims 10-12, 14, and 15 are rejected as being unpatentable over Kurokawa in view of Horiuchi et al., US Patent 5,911,961 (Horiuchi) and Farrauto et al., US Patent 5,804,155 (Farrauto).

Claims 10-12, 14, and 15 depend from claim 1. The patentability of these claims resides at least in part in the **upstream-and-downstream arrangement** of a first catalyst component and a second catalyst component. See amended claim 1.

As discussed above, Kurokawa teaches **disposing one catalytic layer on the top of another catalytic layer** in a catalyst. It does not teach or suggest an upstream-and-downstream arrangement of the two layers.

Horiuchi teaches a catalyst for the purification of an exhaust gas which contains a first catalyst component, i.e., a platinum and/or palladium-carrying first refractory inorganic oxide powder and a metal oxide; and a second catalyst component, i.e., a second refractory inorganic oxide powder and platinum (or palladium). The catalyst is prepared by (i) mixing the elements of the first catalyst component and an aqueous solution, and drying the resultant wet mixture; (ii)

mixing the above-obtained dry mixture with the second catalyst component, and wet-pulverizing the resultant mixture to give a slurry; and (iii) coating the slurry onto a catalyst carrier. See column 6, lines 40-67. The first catalyst component and the second component are **mixed** together and are inseparable. Clearly, Horiuchi does not teach or suggest an upstream-and-downstream arrangement of two catalyst components.

Farrauto discloses a composition containing at least one neutral zeolite or basic zeolite and at least one platinum family metal. All these components are **mixed**, calcined, and coated as one layer on a carrier. See column 7, lines 10-15. Clearly, Farrauto also does not teach or suggest an upstream-and-downstream arrangement of two catalyst components.

Since none of Kurokawa, Horiuchi, and Farrauto suggests or teaches a upstream-and-downstream arrangement of two catalyst components, a combination of them also fails to do so. As the catalysts covered by claims 10-12, 14, and 15 each require an upstream-and-downstream arrangement of two catalyst components, the combination clearly does not render claims 10-12, 14, and 15 obvious.

III

Claim 13 is rejected as being unpatentable over Kurokawa in view of Farrauto.

Claim 13 depends from claim 1. The patentability of this claim resides at least in part in the upstream-and-downstream arrangement of a first catalyst component and a second catalyst component. See amended claim 1.

As mentioned above, neither Kurokawa nor Farrauto teaches or suggests disposing two catalyst components in an upstream-and-downstream arrangement. Since the catalyst of claim 13 requires an upstream-and-downstream arrangement of two catalyst components, claim 13 is not obvious over Kurokawa in view of Farrauto.

IV

Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurokawa and Hidetoshi. Claim 16 has been canceled and all limitations recited in claim 16 have been incorporated in claim 1. Thus, claim 1 will be discussed instead.

As mentioned above, amended claim 1 covers an exhaust gas purifying catalyst which includes a first catalyst component containing a refractory inorganic oxide carrying a platinum family metal, a nitrogen oxide adsorbent, and a hydrocarbon adsorbent; and a second catalyst component for the purification of nitrogen oxide. The first catalyst component is disposed on the upstream side and the second catalyst component is disposed on the downstream side.

Kurokawa has also been discussed above. It teaches an exhaust gas emission control catalyst which includes two catalyst layers, i.e., an over layer and an under layer. The over layer may contain barium and lanthanum (nitrogen oxide adsorbents), metal silicate (e.g., zeolite), and a catalytic metal (e.g., Pd). The under layer may contain a catalytic metal, such as palladium, and barium and lanthanum. The over layer is disposed on the top of the under layer. The metal silicate in the over layer prevents the barium and lanthanum in the under layer from contacting with gas containing sulfur compounds and water and therefore prevents the barium and lanthanum from sulfur poisoning and water poisoning. See column 2, lines 36-39.

Hidetoshi discloses a catalyst for purifying an exhaust gas in a lean atmosphere. The catalyst contains two catalyst components, one of which is arranged on the upstream side and the other is arranged on the downstream side.

The Examiner alleges that one of ordinary skill in the art would have modified the teaching of Kurokawa in view of Hidetoshi to arrive at the catalyst covered by claim 1. He further alleges that “[s]uch modification would have been obvious to one of ordinary skill in the art, because both references are directed towards treating exhaust gases.”

Applicants respectfully disagree and would like to point out that the Federal Circuit “has previously found a proposed modification inappropriate for an obviousness inquiry when the modification rendered the prior art reference inoperable for its intended purpose.” In re Fritch, 23 USPQ2d 1483 (CAFC 1992) n. 12.

An over layer of the catalyst disclosed in Kurokawa prevents an under layer from contacting gas containing sulfur compounds and water, thereby protecting barium and lanthanum in the under layer from sulfur poisoning and water poisoning. An upstream-and-downstream arrangement of the two layers would result in both layers being exposed to the exhaust gas. As a

result, it would not protect barium and lanthanum in either layer from sulfur poisoning and water poisoning. This modification would render the invention of Kurokawa inoperable for its intended purpose, i.e., "to provide a catalyst construction for purifying gases which prevents lanthanum and barium from sulfur poisoning and water poisoning." See column 2, lines 6-8. Thus, Applicants submit, following the Fritch holding set forth above, that the Examiner has failed to establish a *prima facie* case of obviousness.

Even if a *prima facie* case of obviousness had been made (which Applicants do not concede), it could be successfully rebutted by a showing of an unexpected advantage of the claimed catalyst. See Mr. Tatsuya Yoshikawa' Declaration, attached hereto as "Exhibit A." This declaration describes two experiments, i.e., Experiment 1 and Comparative Experiment 1. In Experiment 1, a catalyst having two catalyst components, i.e., a first catalyst component and a second catalyst component, was prepared. The first catalyst component contained a Pt-deposited titania powder, a nickel oxide powder, and ZSM-5 type zeolite; and was coated on the upstream side. The second component contained a platinum ion-exchange zeolite powder and was coated on the downstream side. In Comparative Experiment 1, a catalyst having a reversed arrangement of the first and the second catalyst components was prepared. Table A and FIG. A of the Declaration show that the catalyst obtained in Experiment 1 had greater purification ratios than the catalyst obtained in Comparative Experiment 1 at various temperatures. Of note, it is preferred that a catalyst for purifying an exhaust gas have a higher purification ratio. In view of this unexpected advantage, claim 1 is clearly not obvious over Kurokawa and Hidetoshi.

Since claim 1 is not rendered obvious by Kurokawa and Hidetoshi, claim 17, depending from claim 1, is also not rendered obvious by the two references.

CONCLUSION

For the reasons set forth above, Applicants submit that the grounds for the rejections asserted by the Examiner have been overcome, and that the claims 1-15, 17, 22, and 23 as pending, define subject matter that is novel and nonobvious over the prior art. Applicants ask that all claims be allowed.

Applicant : Takeshi Matsumoto et al.
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Enclosed is a \$110 check for the Petition for Extension of Time fee. Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

 Reg. No. 54,694

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Y. Rocky Tsao
Attorney for Applicants
Reg. No. 34,053

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110-2804
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

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